CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/KNR/W.No.08/CSR-06/075h/CEMENT/2016-17 Date: 28.06.2016

TEST REPORT ON CEMENT

* CUSTOMER	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
*AGENCY	:	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
*NAME OF THE WORK	:	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
*REFERENCE	:	BBMP/EE/BTP/WO/ 53/2016-17
SAMPLE ID	:	Cement
SAMPLE RECEIVED ON	:	25.06.2016
PERIOD OF TESTING	:	25.06.2016 to 28.06.2016

The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988(RA-2009)	30.00 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988(RA-2009)	135 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988(RA-2009)	480 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988(RA-2009)	1 mm	Not more than 10mm

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T-2377

Job No.: CTCE/BBMP/KNR/W.No.08/CSR-06/075h/SAND-Gradation/2016-17 : 28.06.2016

TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

*** Name of Work** : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/53/2016-17

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 25.06.2016

Date of Testing : 28.06.2016

Total Wt. of Aggregates in gms **1000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)			
		Zone-I	Zone-II	Zone-III	Zone-IV
10	100	100	100	100	100
4.75	95.40	90-100	90-100	90-100	95-100
2.36	77.20	60-95	75-100	85-100	95-100
1.18	55.70	30-70	55-90	75-100	90-100
600 Micron	26.70	15-34	35-59	60-79	80-100
300 Micron	13.70	5-20	8-30	12-40	15-50
150 Micron	6.70	0-10	0-10	0-10	0-15

* Information is furnished by the Customer/Representative

Remarks : This sample is under Zone-I specific limits.

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Job No.: CTCE/BBMP/KNR/W.No.08/CSR-06/075h/AGG/GR/2016-17 : 28.06.2016

TEST REPORT ON DETERMINATION GRADATION OF COARSE AGGREGATES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

*** Name of Work** : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/53/2016-17

Technical Reference : IS : 2386 Part 1 -1963 RA-2007

Sample ID : Coarse Aggregates (40mm)

Sample Received on : 25.06.2016

Date of Testing : 28.06.2016

Total Wt. of Aggregates in gms= **7000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)	
		Graded	Single Sized
80	100	100	-
63	100	-	100
40	98.14	95-100	85-100
20	41.21	30-70	0-20
10	17.64	10-35	0-5
4.75	2.64	0-5	-

* Information is furnished by the Customer/Representative

Remarks : This sample is under Graded specific limits.

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Job No.: CTCE/BBMP/KNR/W.No.08/STEEL/2016-17 28.06.2016

TEST REPORT ON REINFORCEMENT STEEL

Customer	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	:	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of the Work	:	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	:	BBMP/EE/BTP/WO/ 53/2016-17
Date of Test	:	28.06.2016
Technical Reference	:	IS: 1786-2008

Sl. No	Nominal size (dia) (mm)	Mass per metre (Kg/mtr)	TENSILE STRENGTH			Bend Test	Rebend Test
			0.20% proof stress/Yield stress N/mm^2	Tensile strength (Ultimate stress) N/mm^2	Elongation percent gauge length		
1	12	0.89	515	558	13.35	O.K	O.K

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Job No.: CTCE/BBMP/KNR/W.No.08/STEEL/2016-17 28.06.2016

TEST REPORT ON REINFORCEMENT STEEL

Customer	:	**Asst. Executive Engineer**, Kodigehalli Sub Division, BBMP, Bangalore.
Agency	:	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of the Work	:	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	:	BBMP/EE/BTP/WO/ 53/2016-17
Date of Test	:	28.06.2016
Technical Reference	:	IS: 1786-2008

Sl. No	Nominal size (dia) (mm)	Mass per metre (Kg/mtr)	TENSILE STRENGTH			Bend Test	Rebend Test
			0.20% proof stress/Yield stress N/mm^2	Tensile strength (Ultimate stress) N/mm^2	Elongation percent gauge length		
1	16	1.58	520	563	13.50	O.K	O.K

A.E.E.

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T-2377

Job No.: CTCE/BBMP/KNR/W.No.06/CSR-06/075h/CUBE/2016-17 27.07.2016

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

*** Name of the work** : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

*** Reference** : BBMP/EE/BTP/WO/ /2016-17

*** Sample ID** : Cement Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{15}

Compressive Strength as on : 28th day

Sample Received on : 27.07.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	29.06.2016	27.07.2016	8.185	369.6	16.43
2	29.06.2016	27.07.2016	8.265	372.3	16.55
3	29.06.2016	27.07.2016	8.356	386.6	17.18

* Information is furnished by the Customer/Representative

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Job No.: CTCE/BBMP/KNR/W.No.06/CSR-06/075h/CUBE/2016-17 28.06.2016

TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

*** Customer** : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

*** Name of the work** : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

*** Reference** : BBMP/EE/BTP/WO/ /2016-17

*** Sample ID** : Drain Covering Slab Concrete

Size of cubes : 150mmx150mmx150mm

Cross Sectional Area : 22500 mm^2

Technical Reference : IS: 516-1959 (Reaffirmed 2008)

*** Grade of Concrete** : M_{20}

Compressive Strength as on : 28th day

Sample Received on : 28.06.2016

Sl.No.	* Date of casting	Date of testing	Weight of cube (Kg)	Failure load (KN)	Compressive strength (N/mm^2)
1	30.06.2016	28.06.2016	8.098	480.3	21.35
2	30.06.2016	28.06.2016	8.189	490.6	21.80
3	30.06.2016	28.06.2016	8.289	515.6	22.92

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04.07.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

Name of Work : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/53/2016-17

Date of Testing : 04.07.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **8105**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	210	210	2.6	97.4	95-100
22.4	2505	2715	33.5	66.5	60-80
11.2	1290	4005	49.4	50.6	40-60
4.75	1185	5190	64.0	36.0	25-40
2.36	985	6175	76.2	23.8	15-30
0.600	900	7075	87.3	12.7	8-22
0.075	800	7875	97.2	2.8	0-8

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Job No.: CTCE/BBMP/KNR/W.No.08/WMM/Gradation/2016-17

04.07.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

Name of Work : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/53/2016-17

Date of Testing : 04.07.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **7750**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	185	185	2.4	97.6	95-100
22.4	2580	2765	35.7	64.3	60-80
11.2	1310	4075	52.6	47.4	40-60
4.75	1005	5080	65.5	34.5	25-40
2.36	980	6060	78.2	21.8	15-30
0.600	785	6845	88.3	11.7	8-22
0.075	620	7465	96.3	3.7	0-8

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04.07.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.

Agency : **Mr. K. Narasimha Raju,**
#175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.

Name of Work : Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/53/2016-17

Date of Testing : 04.07.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **8565**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	130	130	1.5	98.5	95-100
22.4	2505	2635	30.8	69.2	60-80
11.2	1410	4045	47.2	52.8	40-60
4.75	1295	5340	62.3	37.7	25-40
2.36	1080	6420	75.0	25.0	15-30
0.600	990	7410	86.5	13.5	8-22
0.075	825	8235	96.1	3.9	0-8

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Job No.: CTCE/BBMP/KNR/W.No.08/WMM/AIV/2016-17

04.07.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of the Work	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/53/2016-17
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	04.07.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	390	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	88	89	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	301	
4	Aggregate Impact value = percent fines	22.62	22.82	
	100* (W_2/W_1)%			22.72

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/KNR/W.No.08/WMM/S-T/2016-17 04.07.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of Work	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/53/2016-17
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	04.07.2016

Result : Flakiness Index = **11.23%**

Elongation Index = **13.05%**

Result : Combined Flakiness & Elongation index **24.28%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/KNR/W.No.08/SDBC/AIV/2016-17 11.07.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of the Work	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/53/2016-17
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	11.07.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	383	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	81	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	302	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	20.94	21.15	**21.05**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/KNR/W.No.08/SDBC/Shape_T/2016-17 : 11.07.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	: **Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of Work	: Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	: BBMP/EE/BTP/WO/53/2016-17
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 11.07.2016

Result : Flakiness Index = **11.85%**

Elongation Index = **13.25%**

Result : Combined Flakiness & Elongation index **25.10%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

Note:

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Job No.: CTCE/BBMP/KNR/W.No.08/SDBC/Stripping/2016-17

11.07.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of the work	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/53/2016-17
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	11.07.2016

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Type of binder : 80/100

Percentage of binder used : 5.0% by wt.

Total weight of aggregate : 200 g

Total weight of binder : 10.0 g

Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.4	3.50	96.50
2	3.5		
3	3.6		

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Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/KNR/W.No.08/SDBC/Sp_Wa/2016-17 11.07.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
Agency	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
Name of the Work	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
Reference	BBMP/EE/BTP/WO/57/2016-17
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	11.07.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2010	2011	2012	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1255	1256	1257	
4	Weight of saturated surface dry aggregate in air	W_3 g	2022	2025	2026	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	767	769	769	
6	Weight of oven dried aggregate	W_4 g	2010	2012	2015	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.621	2.616	2.620	2.619
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.662	2.661	2.658	2.661
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.60%	0.65%	0.55%	0.60%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/KNR/W.No.08/SDBC/Bitumen/2016-17 11.07.2016

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX
As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Kodigehalli Sub Division, BBMP, Bangalore.
AGENCY	**Mr. K. Narasimha Raju,** #175, 5th Cross, Badrappa Layout, Near G.R. Kalyanamantapa, Bangalore – 94.
NAME OF THE WORK	Improvements to drain and asphalting to roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
REFERENCE	BBMP/EE/BTP/WO/51/2016-17
SAMPLE I/D	Roads in Bhadrappa Layout in Ward No.08, BBMP, Bangalore.
DATE OF TESTING	11.07.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	32.36	6.81	6.81	93.19	90-100
4.75	260.3	54.80	61.61	38.39	35-51
2.36	39.21	8.25	69.87	30.13	24-39
1.18	43.13	9.08	78.95	21.05	15-30
0.3	42.32	8.91	87.86	12.14	9-19
0.075	29.69	6.25	94.11	5.89	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	33.13	6.63	6.63	93.37	90-100
4.75	261.2	52.24	58.87	41.13	35-51
2.36	56.32	11.26	70.13	29.87	24-39
1.18	49.31	9.86	79.99	20.01	15-30
0.3	36.36	7.27	87.26	12.74	9-19
0.075	40.25	8.05	95.31	4.69	3-8

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